

Air Force Civil Engineer Center



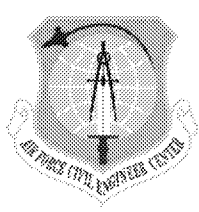
*FORMER
WILLIAMS AIR FORCE BASE*

Site ST012

**Former Liquid Fuel
Storage Area**

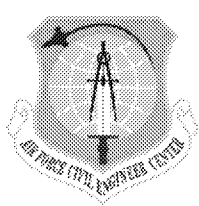
**BCT Call
11 May 2017**

Battle Ready...Built Right!



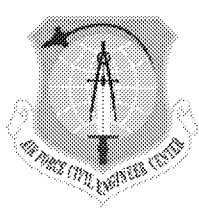
Site ST012 Outline

- **Summary of Activities Since Mar BCT call**
- **SVE Update**
- **LNAPL Monitoring/Removal Update**
- **Groundwater Concentration Update**
- **Path Forward**

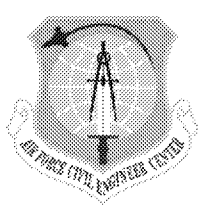


Site ST012 Activities Since March

- **Continued SVE operation**
- **Continued LNAPL screening in accessible SEE wells and Phase I characterization wells**
- **Decommissioned remaining SEE components**



Soil Vapor Extraction System Update



ST012 SVE System Update

- **Jul – Sep 2016**

- TPH removal as reported in Mar BCT call was based on PID - Total petroleum hydrocarbon (TPH) removed – 139,700 pounds or 21,260 gallons
- TPH removal calculations based on laboratory data (as calculated in quarterly reports) - TPH removed – 97,000 pounds or 14,800 gallons

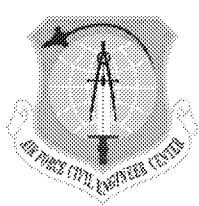


- **Oct – Dec 2016**

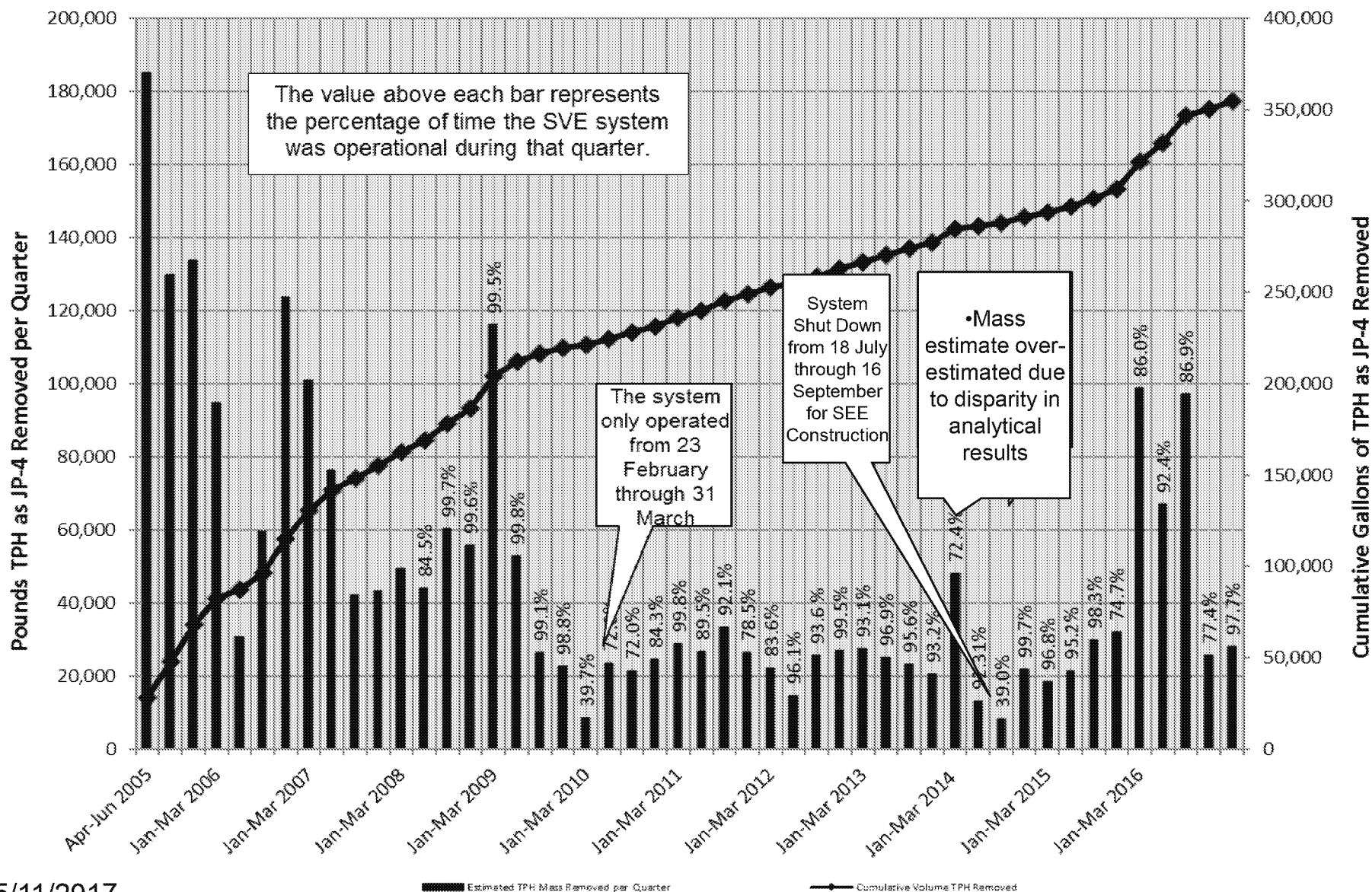
- TPH removal as reported (Mar BCT) based on PID – 90,900 pounds or 13,840 gallons
- TPH removal calculations based on laboratory data – 25,598 pounds or 3,896 gallons

- **Jan – Mar 2017**

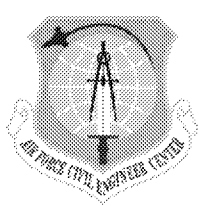
- 98.0% operational uptime Thermox; 98% operational uptime Flamox
- Total petroleum hydrocarbon (TPH) removed – 27,832 pounds or 4,236 gallons



Site ST012 SVE System Performance

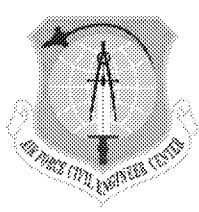


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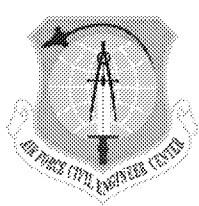


Site ST012 SVE System Summary

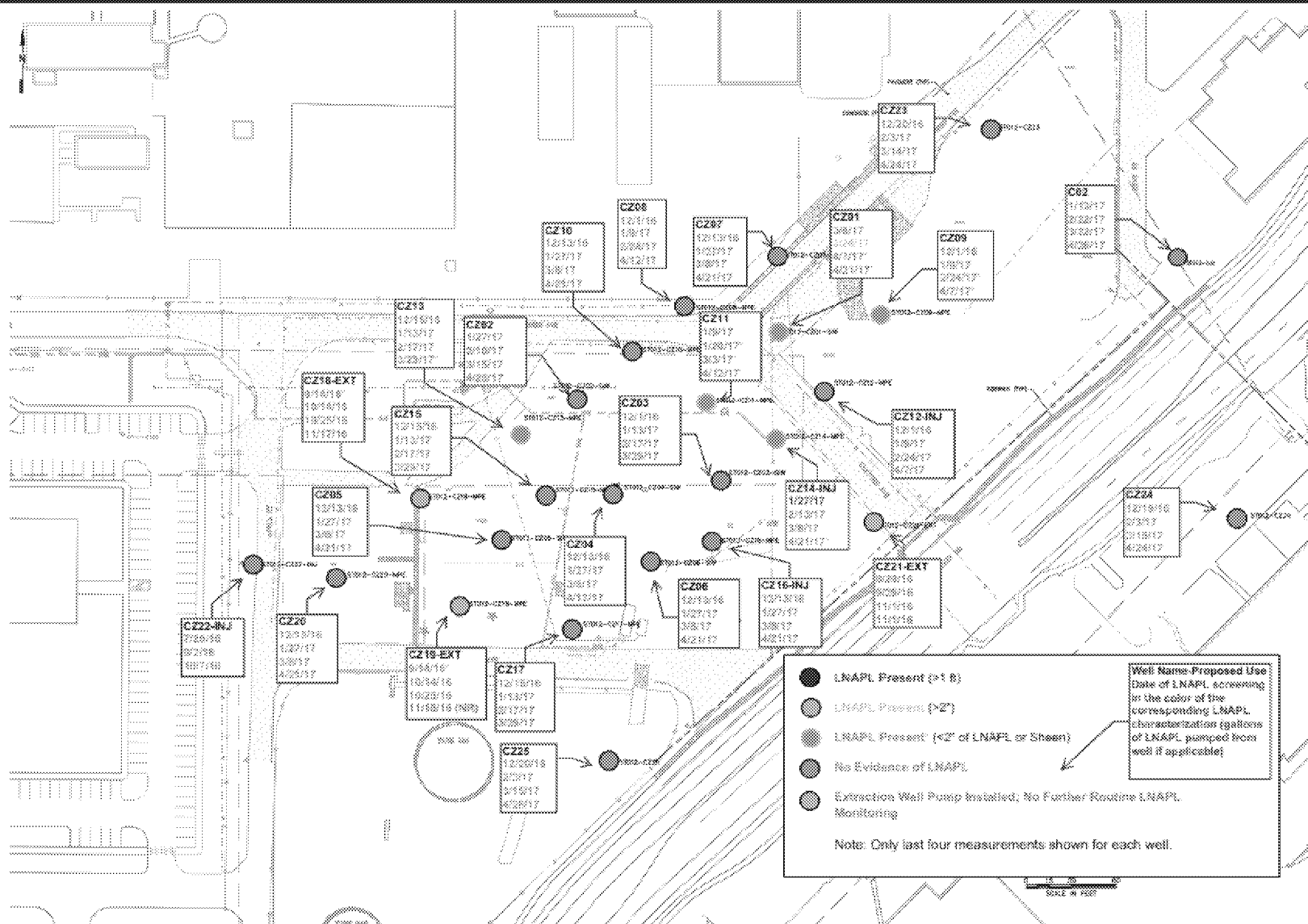
- **TPH removed through Mar 2017 – 354,500 gallons**
- **Methane concentration significant in deep wells (> 100% of LEL); an indicator of ongoing methanogenesis of petroleum hydrocarbons**

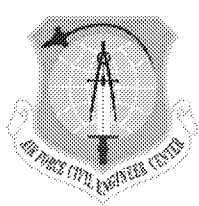


LNAPL Monitoring Update

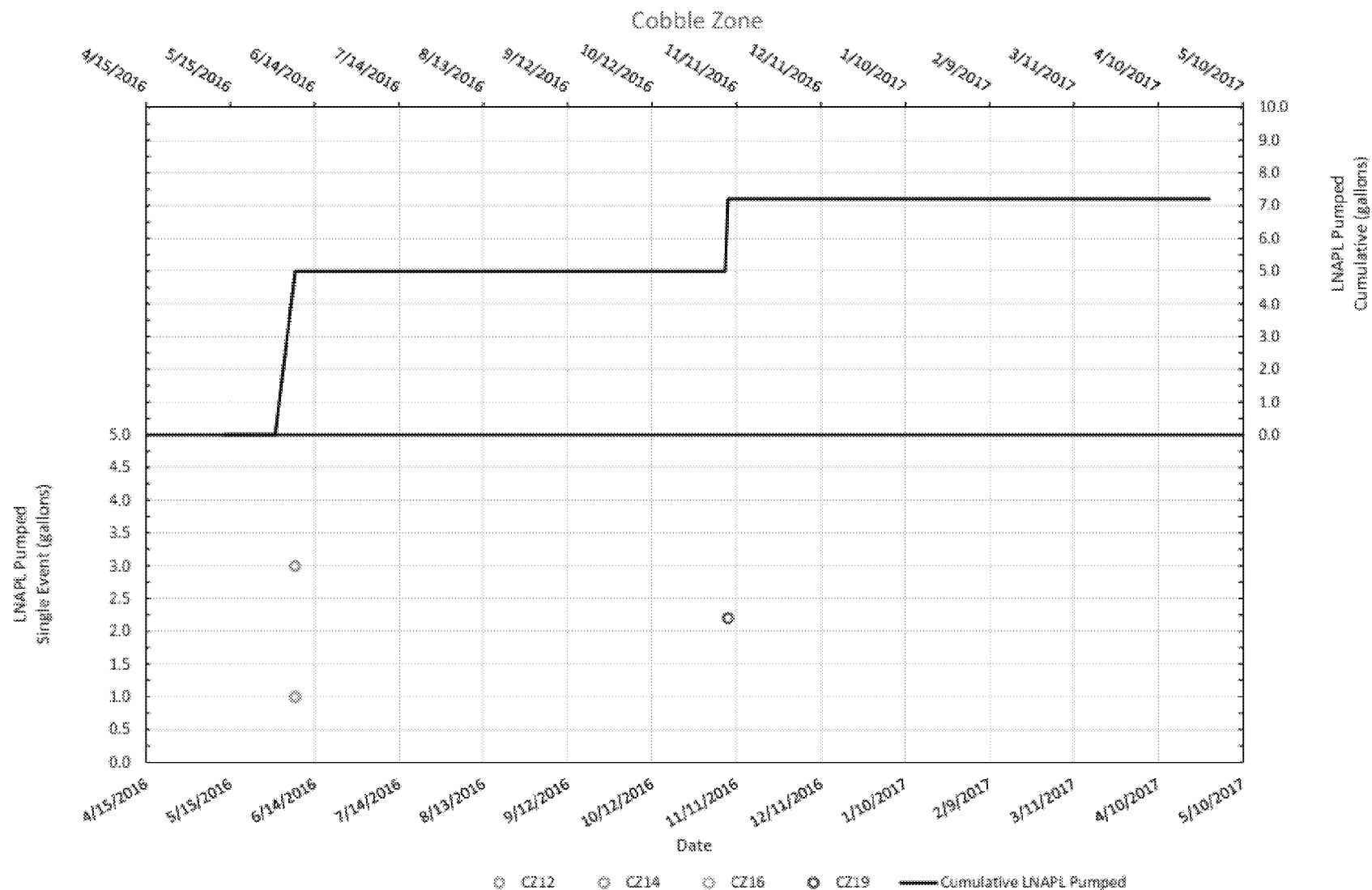


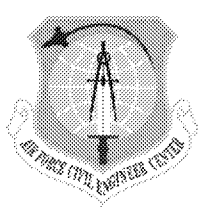
LNAPL Monitoring/Removal Status Cobble Zone





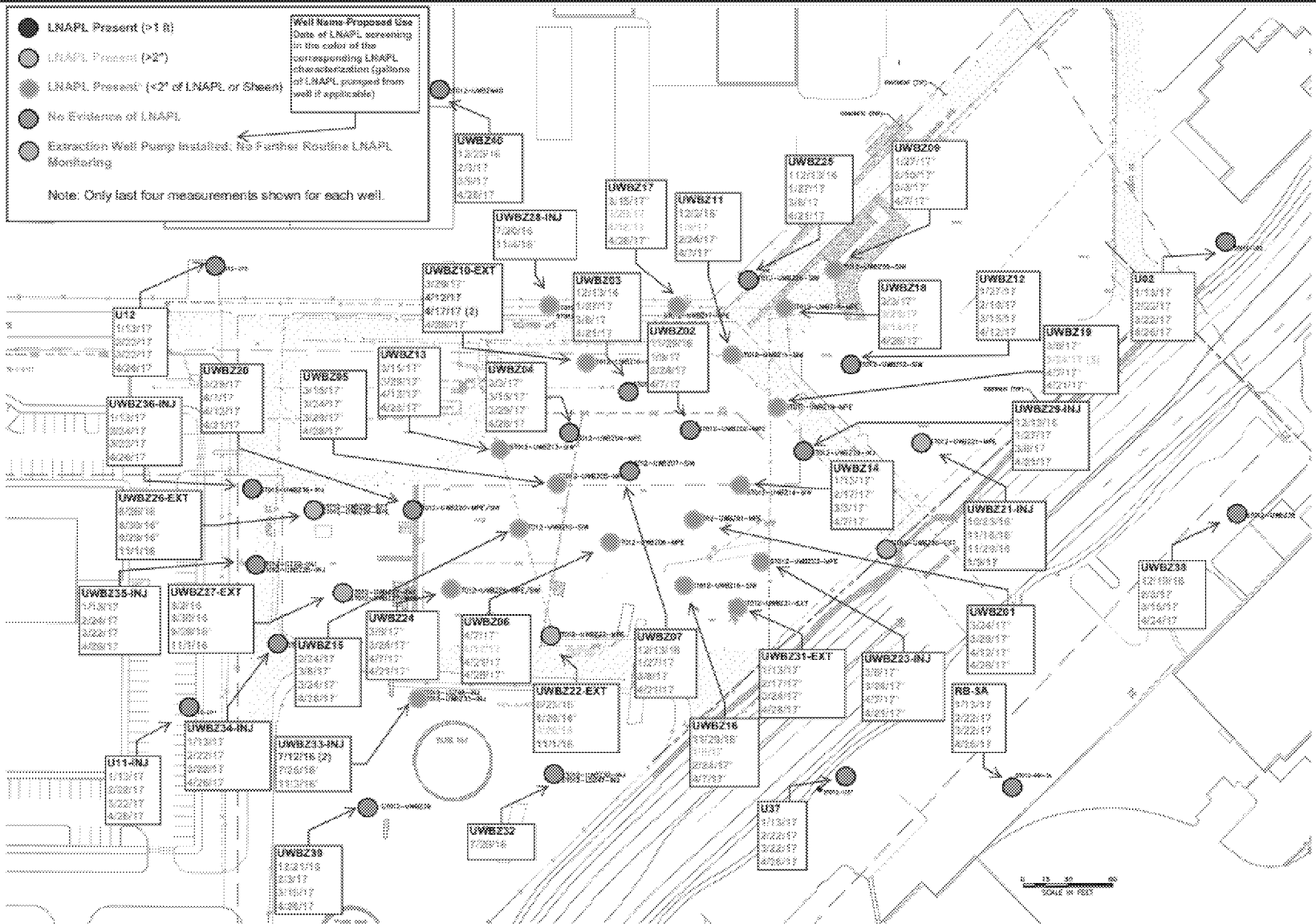
LNAPL Monitoring/Removal Status Cobble Zone

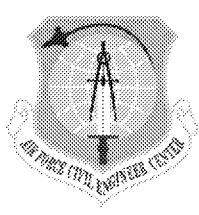




LNAPL Monitoring/Removal Status

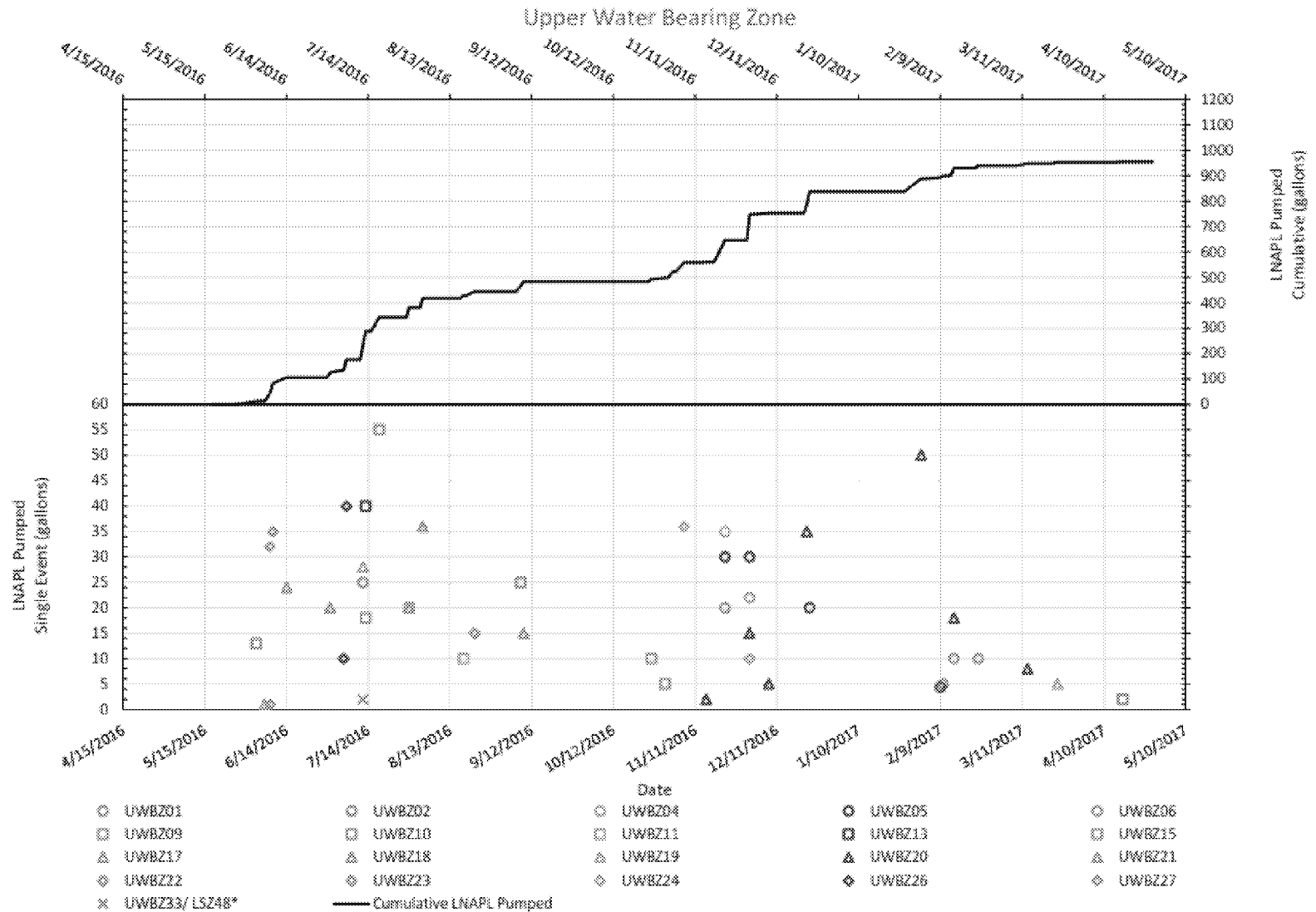
Upper Water Bearing Zone



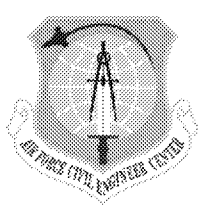


LNAPL Monitoring/Removal Status

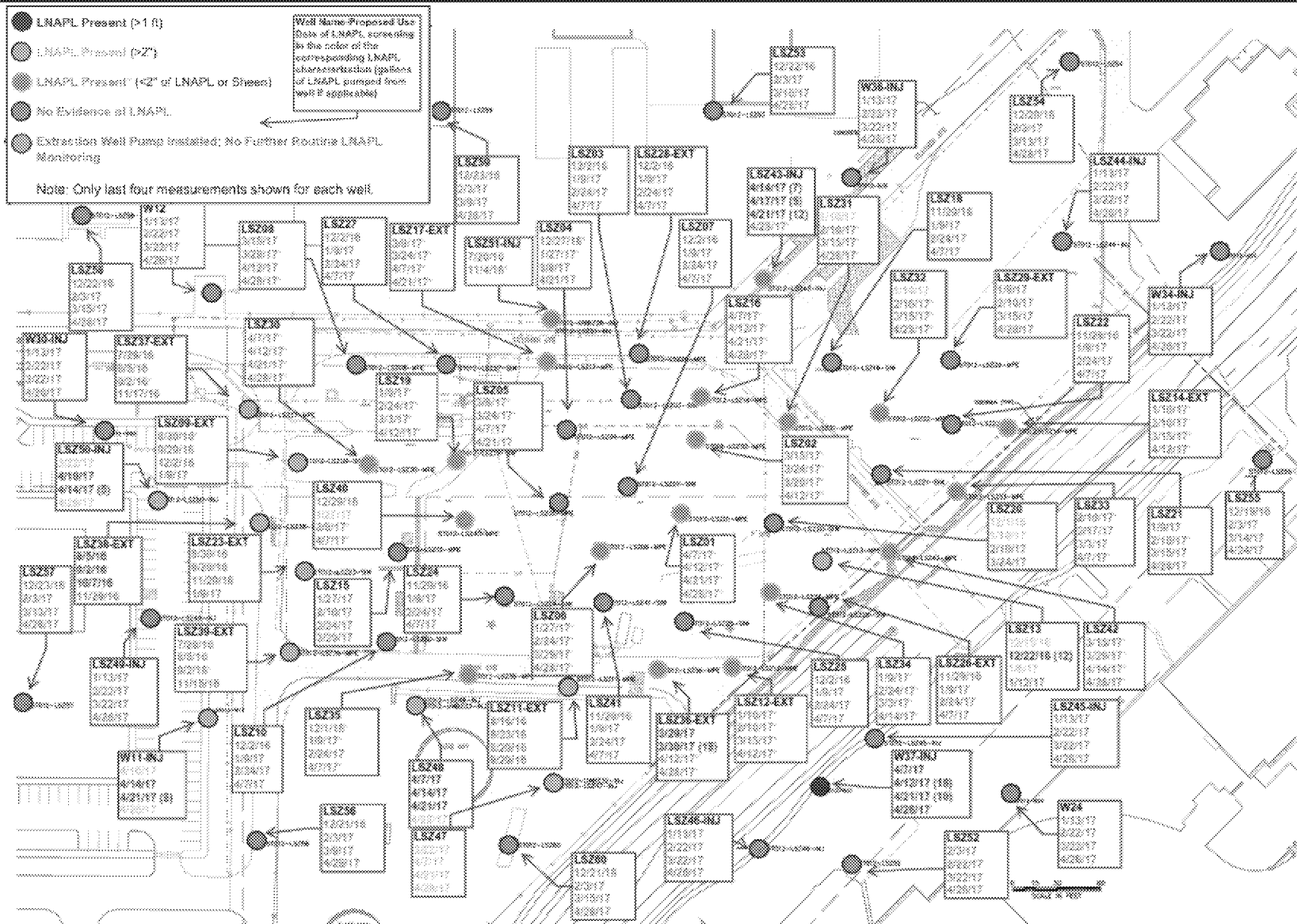
Upper Water Bearing Zone

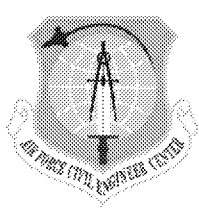


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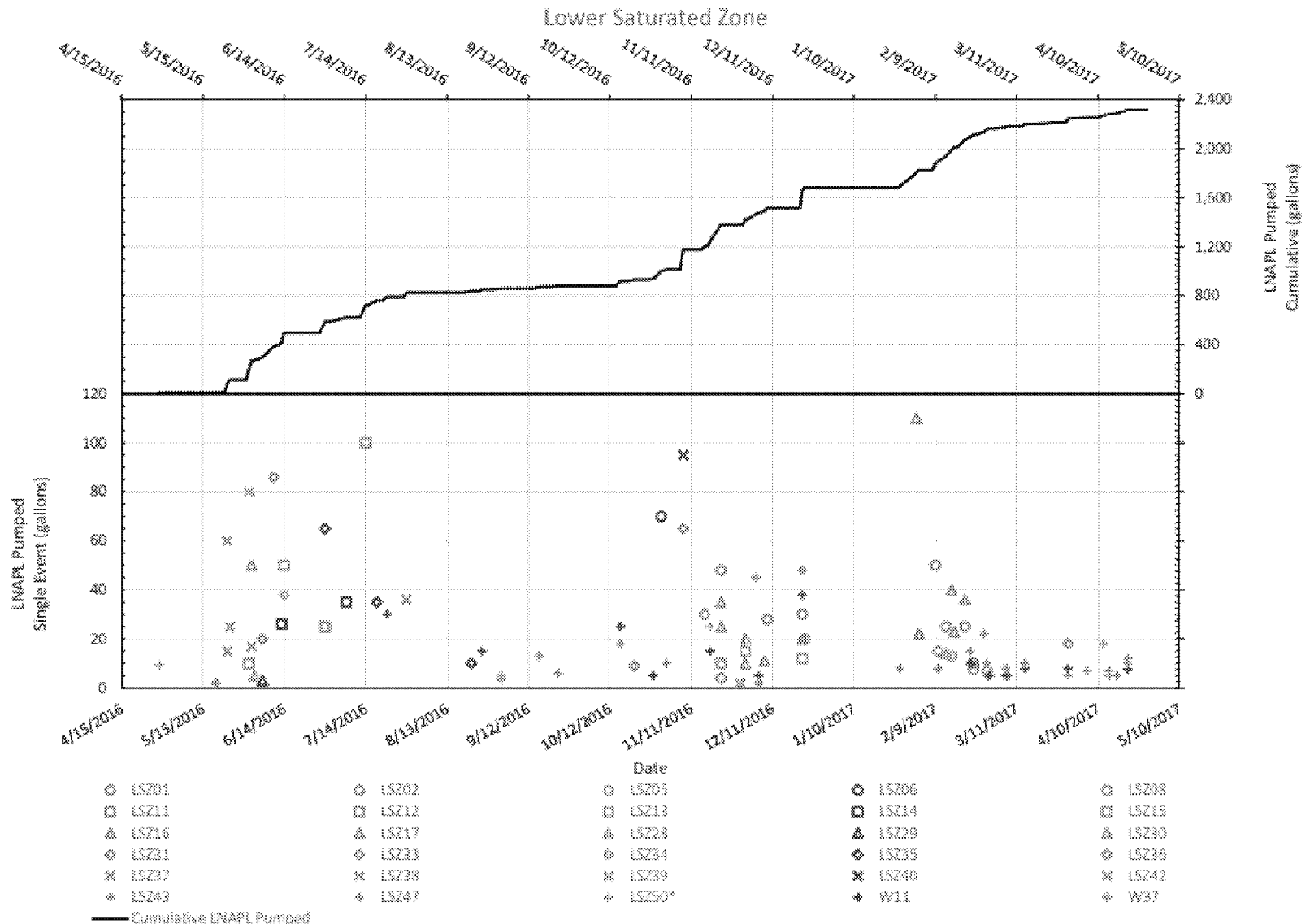
LNAPL Monitoring/Removal Status Lower Saturated Zone



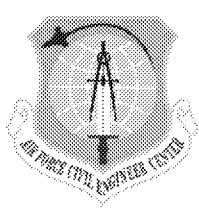


LNAPL Monitoring/Removal Status

Lower Saturated Zone

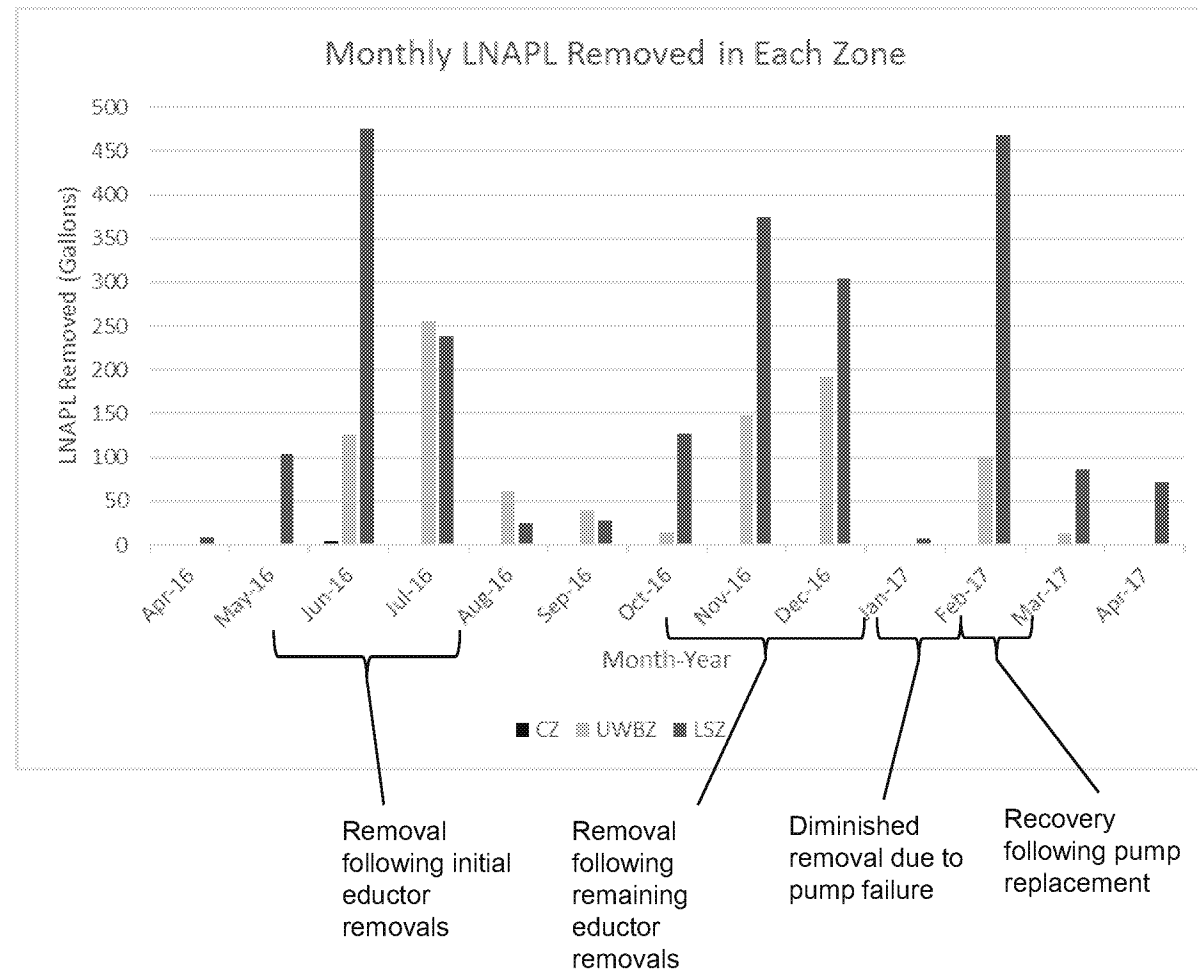


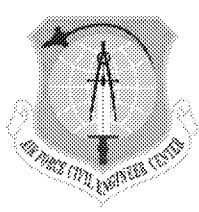
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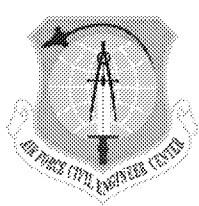
ST012 LNAPL Monitoring/Removal Summary

- **CZ** – ~7 gallons of LNAPL removed. None since Mar 2017 BCT update
- **UWBZ** - ~950 gallons of LNAPL removed. ~15 gallons removed since Mar 2017 update. All LNAPL removed since Mar 2017 from wells near or outside TTZ perimeter (UWBZ10, UWBZ19, UWBZ20).
- **LSZ** - ~2,300 gallons of LNAPL removed. ~100 gallons removed since Mar 2017 update. All LNAPL removed since Mar 2017 from wells near or outside TTZ perimeter (W11,W37,LSZ36,LSZ43,LSZ50).

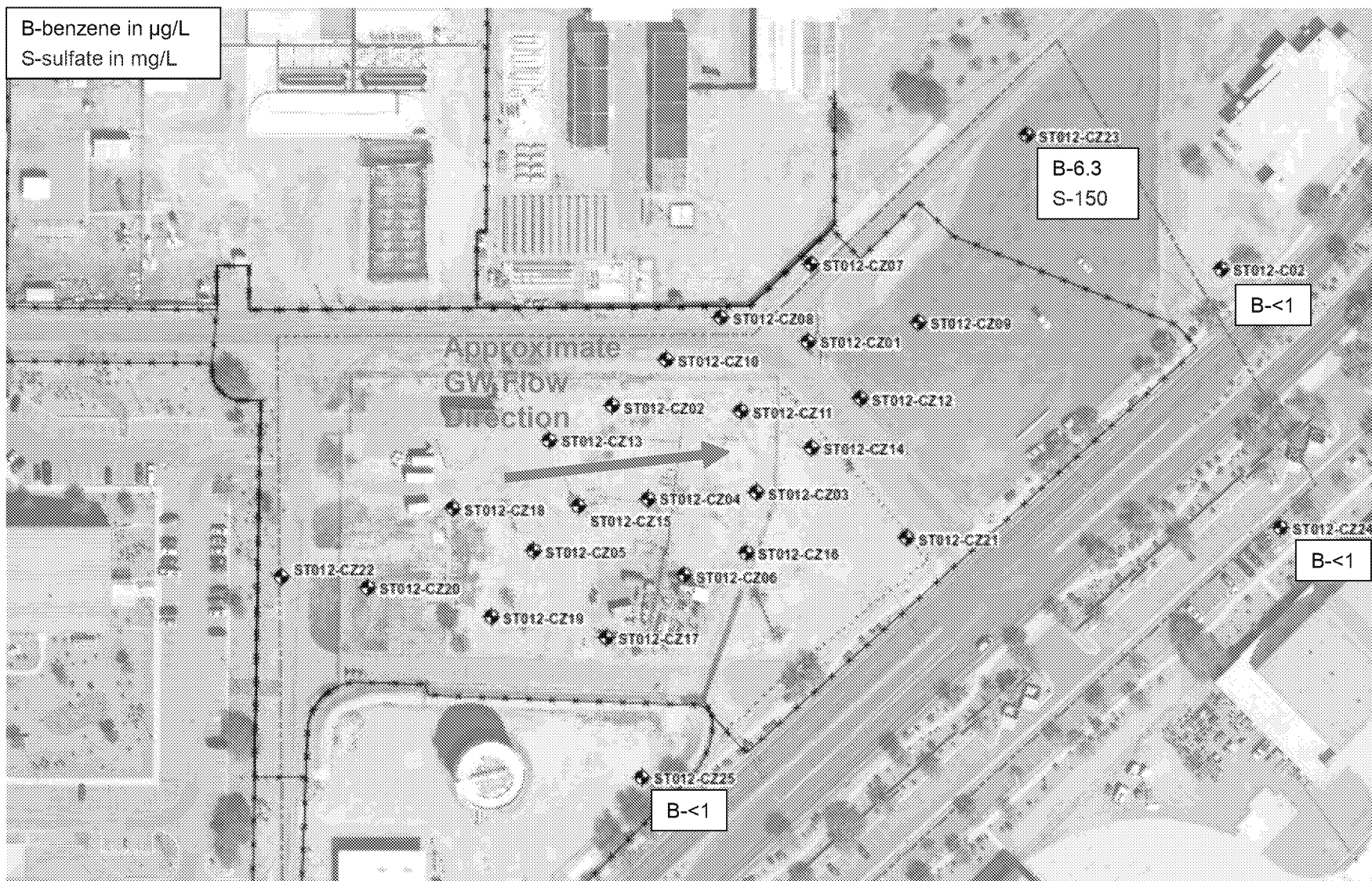


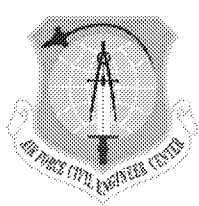


Groundwater Concentrations

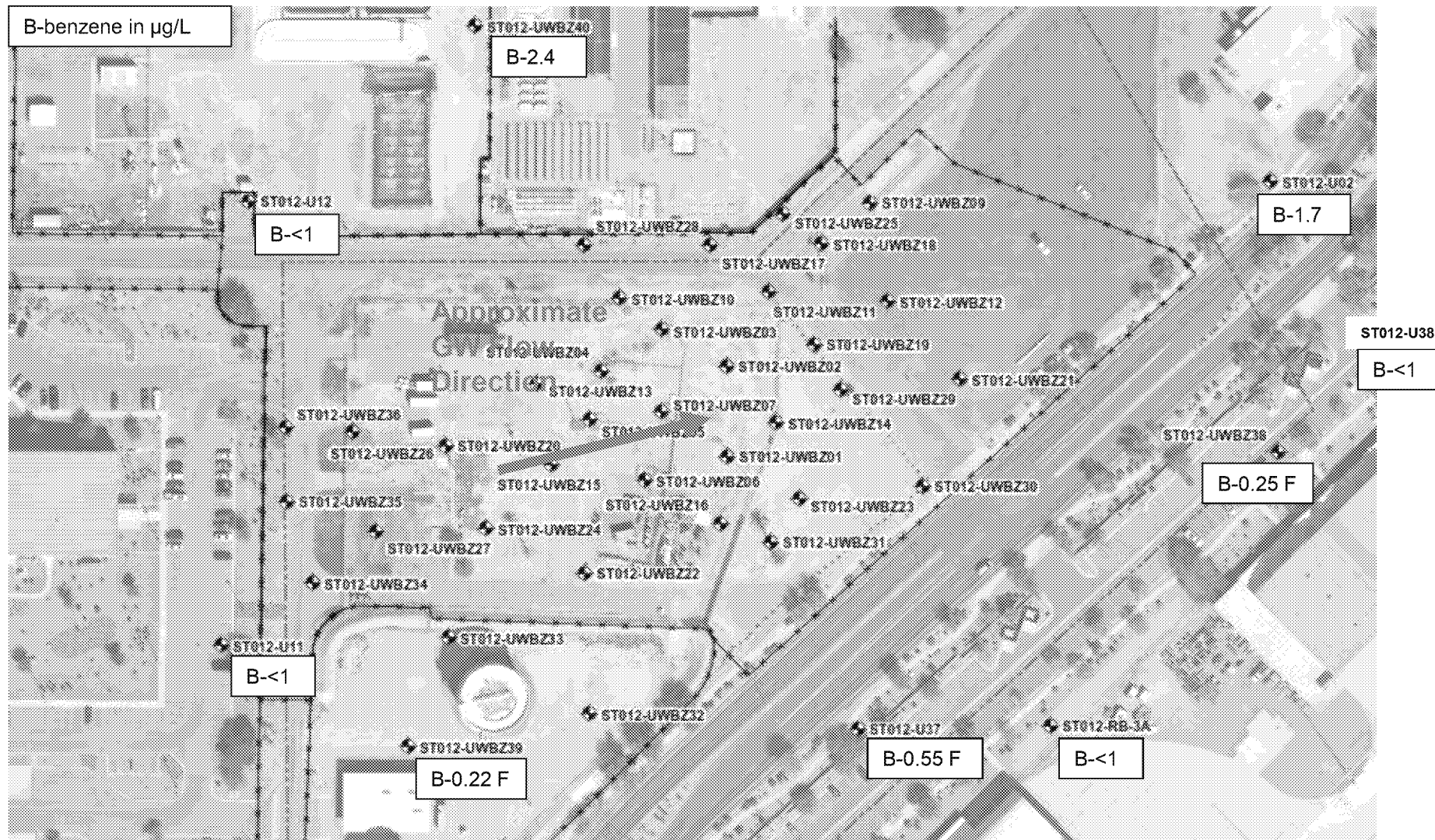


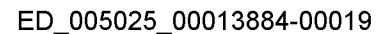
Site ST012 Feb-Mar CZ Groundwater Results

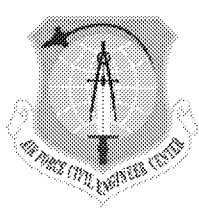




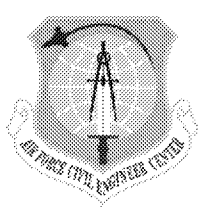
Site ST012 Feb-Mar UWBZ Groundwater Results





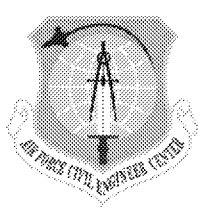


Path Forward



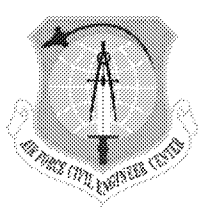
AF/EPA/ADEQ communication since February BCT meeting

- **EPA/ADEQ letter proposes re-implementing SEE or conducting an RI/FS (2/8/2017)**
- **AF letter (2/10/2017) requests finalization of EBR work plan by 4/14/2017**
- **February BCT meeting (2/14/2017). Agencies agree to work toward resolving EBR issues by 4/14/2017.**
- **AF letter acknowledges the BCT Meeting outcome (3/15/2017)**
- **EPA email proposes limited pilot study (4/24/2017)-2 areas in each of 3 zones**
- **EPA email requests extension of sixty days (to 6/25/2017) to continue discussions (4/25/2017)**
- **AF email outlines advantages and appropriateness of full scale implementation (5/2/2017)**
- **EPA communicates by phone that Enrique Manzanilla will contact Dr. Stephen TerMaath to discuss ST012 (5/8/2017).**



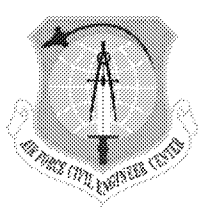
Full Scale EBR Implementation Components

- **Additional characterization conducted post SEE confirms site conditions are appropriate for EBR. Mass estimates are within RD/RA work plan range, plume is stable.**
- **Full scale provides equivalent information (and to a much greater extent) than an EBR pilot study**
- **Full scale is phased, controlled, iterative and will include data collection, optimization and adjustments**
- **Full scale allows for flexibility for adjusting locations and/or initial sulfate injections to allow confirmation of enhancement**



Full Scale EBR Implementation Components (cont.)

- **LNAPL removal ongoing in several known areas pre EBR. EBR monitoring data will assess the degradation/ transformation of LNAPL with the emphasis on the potential flux of benzene into groundwater.**
- **Geochemical and microbiological analyses will be included**
- **Site data will be used to update the estimated remedial timeframe**
- **Specific areas of the site may need additional actions prior to MNA**

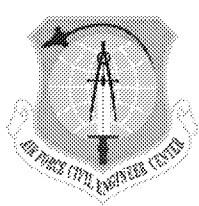


Site ST012 Path Forward

- **Finalize RD/RAWP Amendment 2 Jun 2017**
- **Baseline Resampling Jun 2017**
- **Start Extraction Jun 2017**
 - Evaluate effect on LNAPL accumulation/recovery
- **Install Injection Components Jul 2017**
- **Order Sodium Sulfate Jul 2017**
- **Begin Phase 1 Injections Jul-Aug 2017**

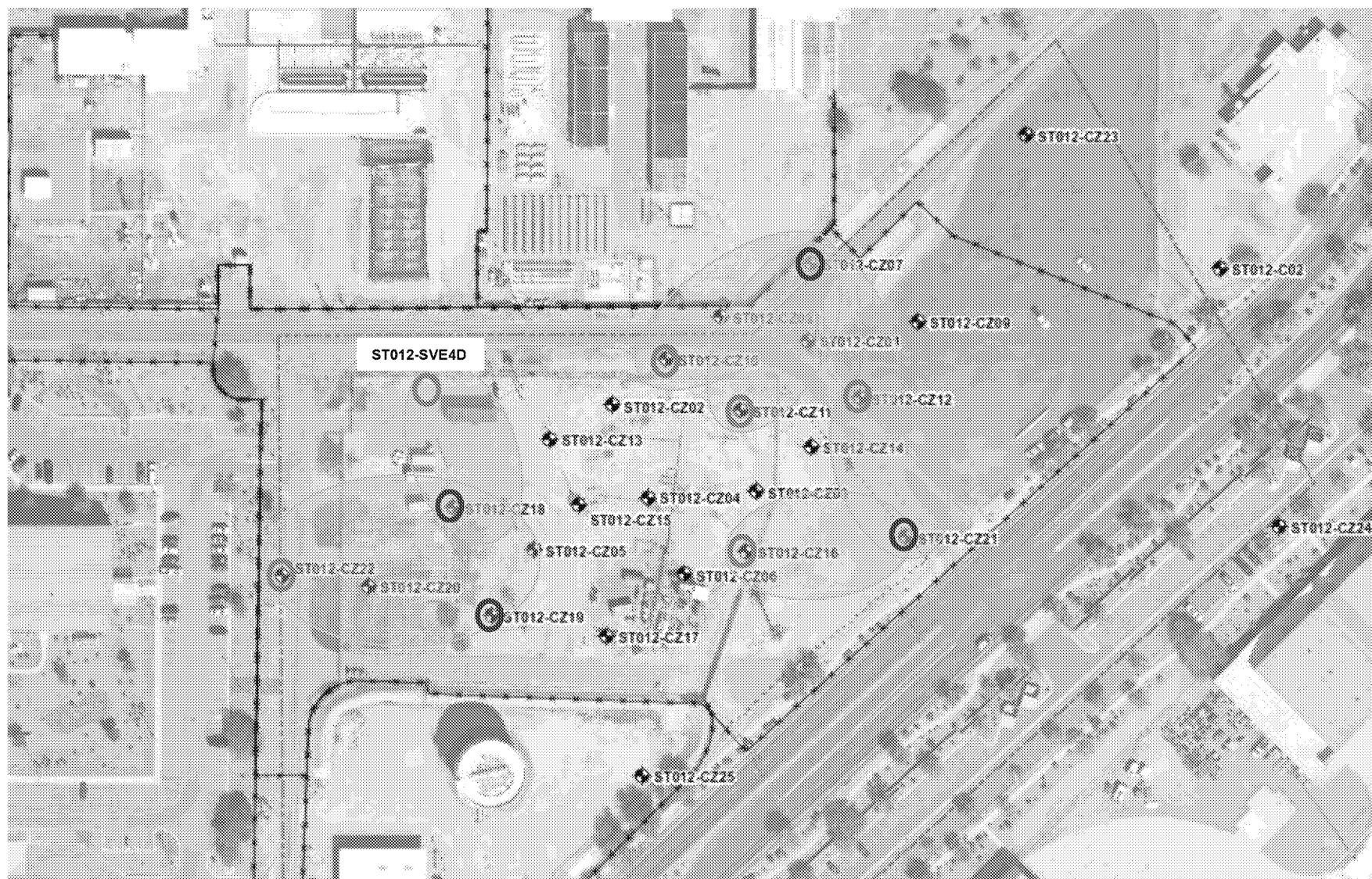
Initial focus on UWBZ Upgradient/sidegradient locations due to:

- UWBZ has lower permeability/longer travel times
- UWBZ has higher estimated petroleum hydrocarbon mass
- Upgradient/sidegradient areas allow opportunity to observe TEA distribution prior to injecting in downgradient locations



Site ST012 Phase 1 EBR Activities

CZ

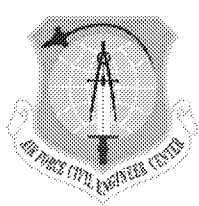


5/11/2017

○ Injection Well

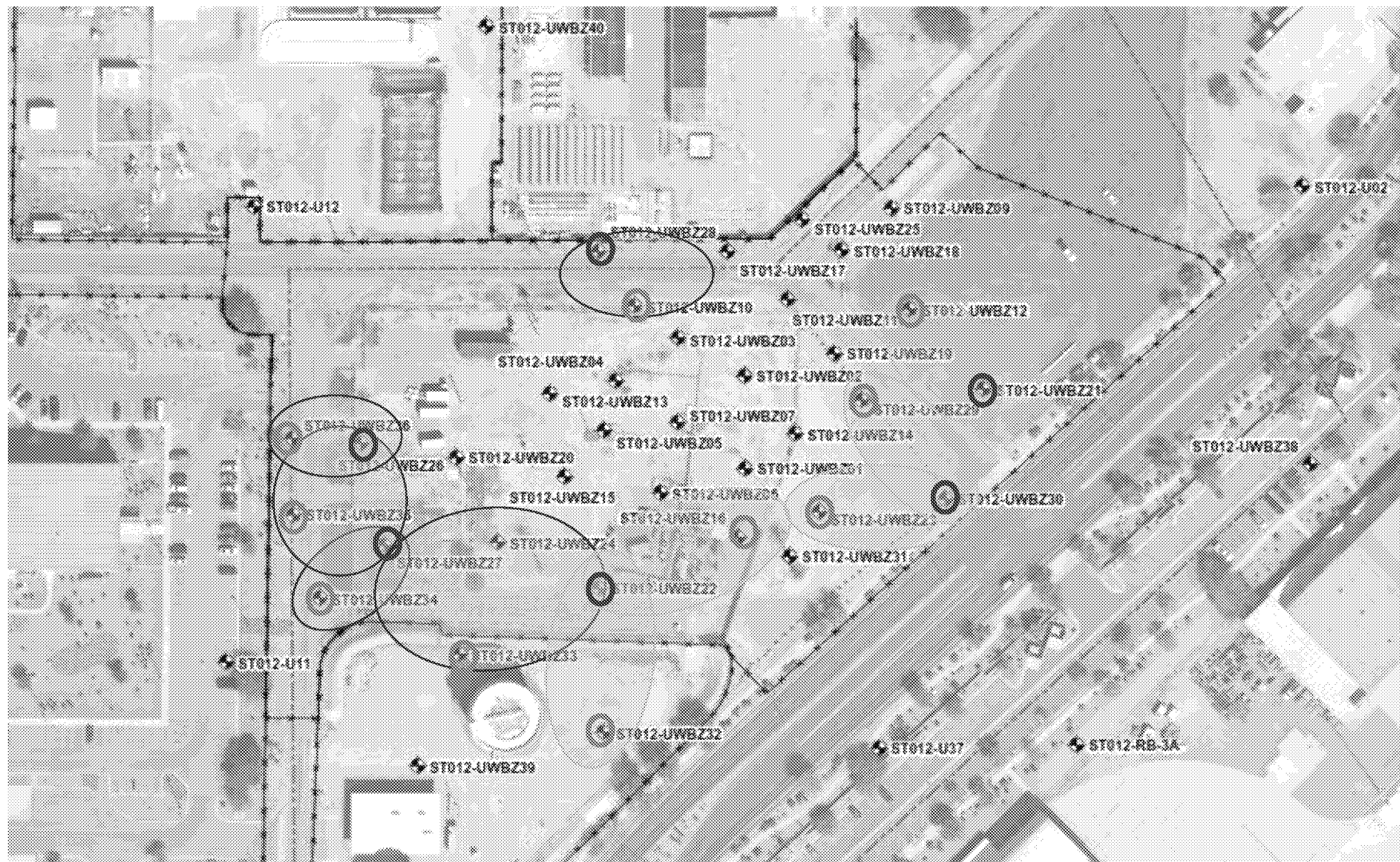
○ Extraction Well

Target Area of Sulfate Distribution by Injection-Extraction



Site ST012 Phase 1 EBR Activities

UWBZ



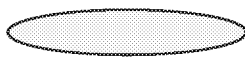
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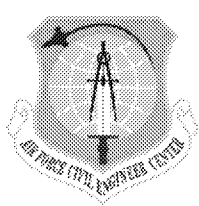
Injection Well



Extraction Well

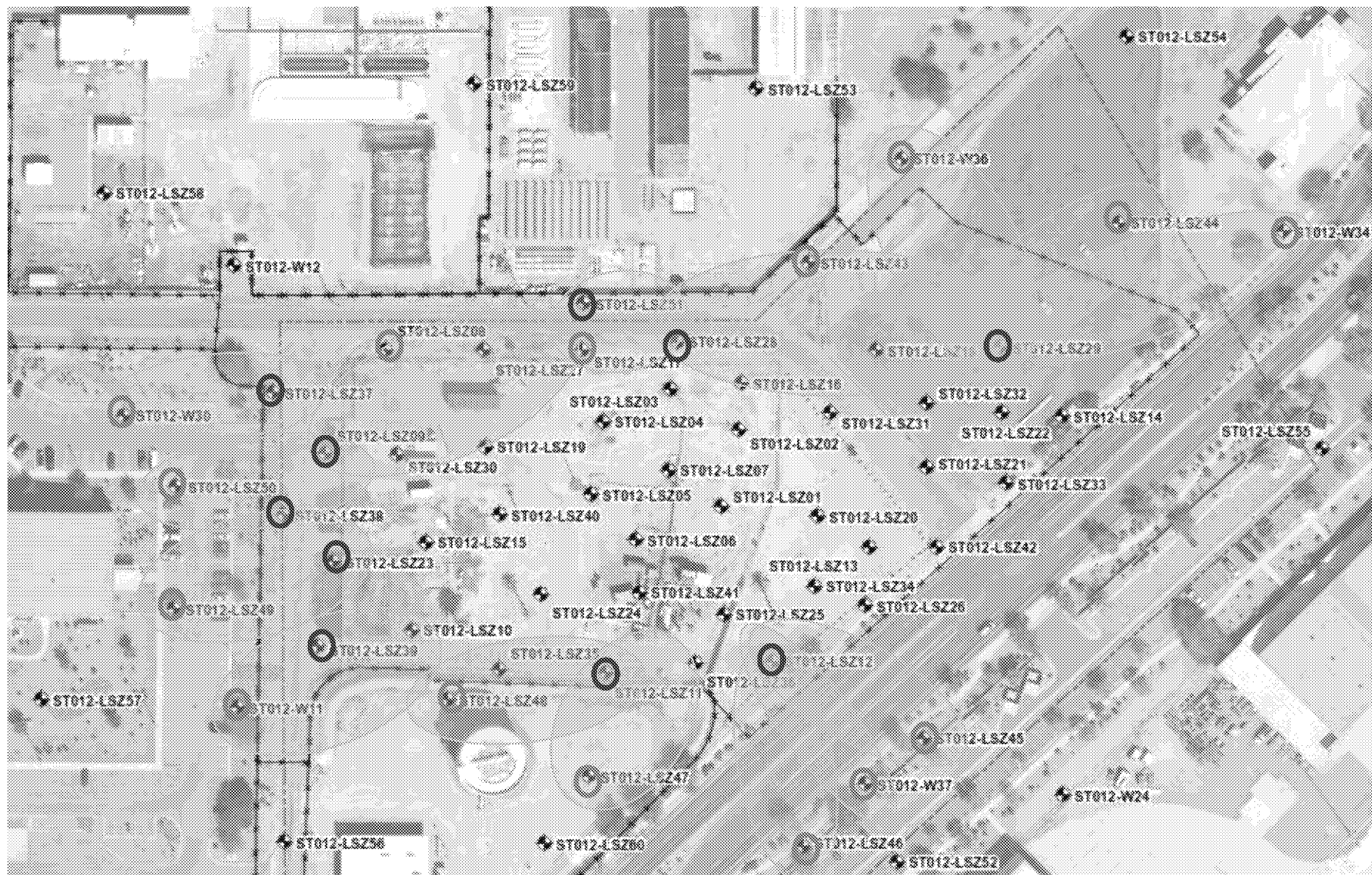


Target Area of Sulfate Distribution by Injection-Extraction (initial locations in red outline)



Site ST012 Phase 1 EBR Activities

LSZ



5/11/2017 ○ Injection Well ○ Extraction Well

Target Area of Sulfate Distribution by Injection-Extraction

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